

Watershed Management for Sustainable Environments

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Humans have had major impacts on watershed hydrology. Urbanization creates large volumes of excess stormwater runoff, causing flooding, water pollution, groundwater recharge deficits, and alterations to stream ecology. Development of rural areas also has had impacts on stream flows, altering stream habitat and sediment balance. Yet, solutions currently proposed to deal with these issues often involve large centralized infrastructure and with correspondingly high expense. We have taken an interdisciplinary perspective to researching approaches to the assessment and sustainable management of flow regimes in different types of land uses. Our approach is multi-faceted, and exemplified by three current projects: 1) a collaborative research project with United States Department of Agriculture - Agricultural Research Service that will study changes in runoff-formation processes under controlled laboratory and watershed conditions due to land alteration caused by urban development, improve modeling support for prediction of hydrologic impacts associated with urbanizing watersheds, and develop innovative best-management practices (BMPs) for controlling water and chemicals, 2) a project involving state and local stakeholders which will study innovative approaches to the management of storm water runoff in an urban watershed; determine a direct relationship between increased on-lot runoff storage capacity and reduction in peak flows, flow variability, and bank erosion; determine the potential for improvement in ecological integrity indices; and better understand factors in the applicability of a tradable credit system for storm water management in urban watersheds, and 3) a project to provide hydrologic support to an ORD interlab assessment of the Little Miami River in Ohio wherein we collaborate with researchers from NERL and NCEA to develop a comprehensive database that links the geographical, hydrological, biogeochemical, and ecological aspects of the Little Miami River ecosystem. We expect that the results of each of these interdisciplinary projects will integrate economic, hydrologic, and ecological facets of runoff issues and provide well-integrated risk management guidance to regions, states, and other agencies to aid in their missions dealing with hydrologic alteration as a consequence of changing land use patterns.

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